

## CLAIMS

1. A radio frequency (RF) coil array for use in resonance imaging and/or analysis of a subject located within a space in which a magnetic field is operatively applied in a first direction, the coil array comprising a plurality of coil elements angled relative to each other and electrically separate from each other, each coil element having a pair of main conductors extending generally parallel to the direction of the magnetic field and located on opposite sides of the space, and a pair of connection conductors connected between respective ends of the main conductors.
2. A coil array as claimed in claim 1, wherein the space is a cylindrical space and the main conductors extend axially and are located diametrically opposite each other.
3. A coil as claimed in claim 2, wherein the coil elements are angularly spaced about the axis of the cylindrical space, and are each located in a respective diametric plane of the cylindrical space.
4. A coil array as claimed in claim 3, wherein the coil elements are equi-angularly spaced, the angle between adjacent coils being  $360/N$ , where  $N$  is the number of coil elements in the array.
5. A coil array as claimed in claim 2, wherein at least one connection conductor extends around the periphery of the cylindrical space at a respective axial end thereof to thereby permit access to the cylindrical space through that end.
6. A coil array as claimed in claim 2, wherein the coil elements are arranged in one or more orthogonal pairs.
7. Resonance imaging apparatus comprising  
a space for receiving a subject to be imaged,

magnet means for applying a magnetic field to the space in a first direction, and

5 a radio frequency (RF) coil array comprising a plurality of angularly spaced coil elements, each coil element having a pair of main conductors extending generally parallel to the direction of the magnetic field and located on opposite sides of the space, and a pair of connection conductors connected between respective ends of the main conductors.

8. Apparatus as claimed in claim 7, wherein the space is a cylindrical space and the main conductors extend axially and are located diametrically opposite each other.

9. Apparatus as claimed in claim 8, wherein the coil elements are angularly spaced around the axis of the cylindrical space, and are each located in a respective diametric plane of the cylindrical space.

10. Apparatus as claimed in claim 9, wherein the coil elements are equi-angularly spaced, the angle between adjacent coils being  $360/N$ , where  $N$  is the number of coil elements in the array.

20 11. Apparatus as claimed in claim 8, wherein at least one connection conductor extends around the periphery of the cylindrical space at a respective axial end thereof to thereby permit access to the cylindrical space through that end.

25 12. Apparatus as claimed in claim 8, wherein the coil elements are arranged in one or more orthogonal pairs.

30 13. Apparatus as claimed in claim 7, wherein each coil is used as a receiver coil, the apparatus further comprising a plurality of receiver channels each connected to a respective coil, and means for combining the signals from each coil to form a composite image.

14. Apparatus as claimed in claim 7, wherein at least one coil is adapted to be used as both a transmitter and receiver coil.

5 15. Apparatus as claimed in claim 7, wherein the coil elements are arranged in one or more orthogonal pairs, one coil element in each pair being adapted for use as a transmitter coil and the other coil element in each pair being adapted for use as a receiver coil, each orthogonal pair being sequentially active, the apparatus further comprising a receiver channel and switching means for selectively connecting the receiver channel sequentially  
10 to the receiver coil of the active orthogonal pair.

16. Apparatus as claimed in claim 15, wherein each transmitter coil of each orthogonal pair is adapted to generate a radio frequency pulse of different amplitude and phase to the transmitter coil(s) of the other orthogonal pair(s).

15

17. A rotary switched RF coil array arrangement for combined parallel imaging of a subject located in a cylindrical space, the coil array arrangement comprising  
a plurality of separate coils spaced angularly about the axis of the cylindrical  
20 space, each coil including a pair of main conductors extending axially on diametrically opposite sides of the cylindrical space,  
a receiver channel, and  
switching means for selectively connecting the receiver channel sequentially to the coils.

25

18. A coil array arrangement as claimed in claim 17, wherein each coil has a pair of connection conductors connected between respective ends of the main conductors, the connection conductors at one or both ends being non-diametrical to permit access through the respective axial end of the cylindrical  
30 space.